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Louis L'amour Fire

Park County (Clark), Wyoming—November 15, 2021

William Jerome Ruth, individually, and as Wrongful Death Representative of the Estate of Cynthia Shook Ruth v. Beartooth Electric Cooperative, and Asplundh Tree Expert, LLC

United States District Court for the District of Wyoming—Case No.: 2:22-cv-00230-KHR

Dear Mr. Bona:

I was retained in July 2023 by Carlson, Calladine & Peterson LLP to investigate the nature and condition of a black cottonwood which allegedly contacted a Beartooth Electric Cooperative (BEC) 7.2kv distribution conductor during strong gale force winds with even stronger gusts[1] on 15 November 2021, allegedly causing the Louis L'amour Fire—'the fire'. The fire originated on private property located at 197 Louis L'amour Lane, Clark, WY, and was initially named the Clark Fire. The Client on whose behalf I prepared this report is Defendant Asplundh Tree Expert, LLC.

[1] Clark Wildland Fire Weather Review, prepared by Fire Weather Meteorologist Paul Werth, 3 November 2022, p. 14

Background

In preparing this report I read, participated in, or otherwise relied upon the following:

(Specific citations of references used in this report will be footnoted.)

1. Observations of subject cottonwood tree branches, twigs, and [dried] foliage; and observation of a KDM 0112 microscope image of tree sample 11.01 at Kilgore Engineering/Micron Imaging, Englewood, CO on 14 August 2023;

2. Observations of subject cottonwood macroscopic and microscopic images of samples 1.0101 (No. 4), 1.02 (Nos. 5, 5a, 5b), 9.010601 (Nos. 2, 2a), 9.0201 (Nos. 1, 1a, 1b), and 11.0101 (No. 3) at Golden Forensics, Centennial, CO on 14 August 2023;

3. Plaintiff's expert reports authored by Ana Cristina Fulladolsa Palma, Ph.D.; John Goodfellow; Alan Carlson; Paul Way/Sam Shuck; and Paul Werth;

4. Defendant BEC's expert report authored by Eric Black/David Neidig;

5. Numerous exhibits, deposition transcripts, and case materials received from the law office of Carlson, Calladine & Peterson on 16 August 2023;

6. Numerous photographs of tree samples and other exhibits received from the law office of Carlson, Calladine & Peterson on 26 & 31 July 2023; and 7, 15, & 16 August 2023;

7. Several publications identifying and describing bark and wood pathogens and diseases of tree species in the *Populus* genus;

8. Utility Tree Risk Assessment BMPs, published by the International Society of Arboriculture, 2020;

9. ANSI A300 Part 9 tree risk/tree failure assessment standards published by ANSI, 2011; and

10. Personal experience in investigating numerous wildland fires throughout the United States over the past 40 years, including but not limited to studying the

effects of fire injuries, insects, and diseases affecting coniferous and deciduous trees, including cottonwood species.

To date, I have not visited or inspected the incident site near Clark, WY.

Analysis and Results

1. Evidence examination—Kilgore Engineering/Micron Imaging, Englewood, CO—14 August 2023[2]

1.1 The coloration, texture, and shape of twigs and foliage indicates the subject tree is a black cottonwood, (*Populus trichocarpa* [or hybrid thereof]). The exact species of cottonwood in this case is somewhat academic, as all species of cottonwood in the Rocky Mountains region are susceptible to the same types of canker[3] fungi with the same or similar results; i.e., browning and/or blackening of bark and outer wood tissues, sloughing of bark, erumpent pustules of fungal fruiting bodies, twig dieback and death, and often the clean (not fractured or split) shedding of dying or dead twigs and small branches (cladoptosis[4]; Day IMG_0073).

1.2 Many subject tree samples exhibited varying degrees of fungal cankering from what likely is both Sooty-bark and Cytospora sp. cankers. (There are several fungal canker diseases of cottonwood species throughout the United States which mimic the signs and/or symptoms of the Sooty-bark disease, especially the black coloration of infected bark and wood tissues.[5] For the purposes of this report, Sooty-bark canker will be referenced.) The nature and extent of Sooty-bark symptoms are wide-ranging in appearance on the tree bark and/or outer wood, occurring in scattered patterns, linear patterns, or leopard-spotting patterns; however, one symptom is consistent—the black coloration of diseased bark and outer wood tissues (Day IMGs_0076, 0098, 0113, 0114, 0120, 0137). Unfortunately, because of the length of time that has elapsed between November 2021 and August 2023, signs of the primary Sooty-bark disease have dried, decayed, and are otherwise not in suitable condition to culture. Dried and matted fungus propagules, however, are still apparent under high magnification[6]. Conversely, since the

[2] Day Macroscopic & Microscopic Photos—Kilgore Engineering Lab
[3] An infectious lesion which can be primary in the case of Sooty-bark or related cankers, or secondary in the case of Cytospora sp. cankers.
[4] A twig and branch shedding phenomenon typically exhibited by tree species in the genus *Populus* (cottonwood and poplar)—Salicaceae family.
[5] Hepting, George H., 1971. Diseases of Forest and Shade Trees of the United States. USDA-FS Agriculture Handbook No. 386, pp. 378-398.
[6] Day Microscope Photos—Golden Forensics Lab

Cytospora fungus is secondary, there were relatively recent signs and symptoms of this disease present in the subject tree, from which the fungus probably could be successfully cultured (Day IMG_0077).

1.3 One sample examined appeared to exhibit patches of dried fungus material as well as a few char or burn scars (Day IMGs_0100, 0101, 0102).

2. Evidence examination—Golden Forensics, Centennial, CO—14 August 2023[7]

2.1 Erumpent pustules and blackened bark tissues are evident in the noted samples. Even though there is evidence of stringy fungal hyphae and mucilaginous spore heads on the surface of select samples, these signs are attributed to surface mold/mildew and are not pathogenic. The old, dried, and infolded propagules of the Sooty-bark-like fungus can be observed under high magnification as noted in series images of samples 11.0101, 9.0201, 9.010601, and 1.02[8].

Discussion

Ana Cristina Fulladolsa Palma, Ph.D.—Expert Report[9]

1. Examinations were made on "Items E1, E9, and E11 in Exhibit 8".

1.1 Item E1: "Tree branch w/burn on end"

I concur with Dr. Fulladolsa Palma that the branch showed blackened, dry, dead tissue on the proximal end. The blackened wood tissue was present throughout the entire diameter of the branch end, and is typical of char. There was no evidence of fungal cankering or pathogenic organisms. It is unclear as to how or when the proximal end of the branch was burned, and there is no evidence of contact with a conductor. It is likely that the branch either broke out of the subject tree or another cottonwood nearby, or the branch was shed as a result of cladoptosis, the phenomenon described in paragraph 1.1 under Analysis and Results above.

[7] Day Macroscopic & Microscopic Photos—Golden Forensics Lab
[8] Day Microscope Photos—Golden Forensics Lab
[9] Expert Report of Ana Cristina Fulladolsa Palma, Ph.D., 14 August 2023

1.2 Item E9 and Subsamples E9.010602, E9.02, and E9.05

All items and subsamples exhibited signs and/or symptoms of fungal canker disease. Dr. Fulladolsa Palma identified the fungi present as *Cytospora* sp. or other saprophytic fungi colonizing the dead tissue. The tissues were blackened; however, because she did not discover "water soaking" or browning around the wounds, she concluded that the symptoms were indicative of mechanical damage rather than disease. I concur with Dr. Fulladolsa Palma that there were visible orange spore tendrils exuding from the bark in multiple branches, which are diagnostic for *Cytospora* sp.

Rebuttal:

Dr. Fulladolsa Palma did not investigate the likelihood that other diseases, such as Sooty-bark canker, were present in the black cottonwood, perhaps for two to three years prior to the fire. Water soaking of tissues around wounds would not be present simply because the samples were aged and bone-dry. I observed browning around several pustulated wounds on various twig samples, and observed symptoms which were caused by disease—not by mechanical damage. I did not observe any evidence of conductor-related mechanical damage on any twig or branch sample; for example, I did not observe conductor caused striations on bark or wood, nor did I observe any indentations into bark or wood which were caused by a conductor, nor did I observe any char grooves on bark or wood.

1.3 Item E11 and Subsample E11.0102 (bark sample from 11.01)

I concur with Dr. Fulladolsa Palma that the subject branch and stubs exhibited blackened, dry, dead bark and wood tissues, and that a few char patches were evident. I disagree, however, that no disease symptoms were present. The evidence indicates the presence of old, blackened, encrusted wood tissue (callus) caused by fungal cankering in the absence of the characteristic jet black, somewhat shiny charred wood.

2. Discussion section

2.1 Dr. Fulladolsa Palma opined that "The puncture-like, longitudinally aligned wounds on branches of item E9 are not caused by a pathogenic organism and the blackening of some of the tissues within the wounds is likely due to heat or fire injury."

Rebuttal:

The publication Dr. Fulladolsa Palma cited[10] in relation to symptoms of char-type blackening within or around wounds focused only on post-fire assessments for conifers (e.g., Douglas-fir, pine, spruce, cedar, larch) in Oregon and Washington, which is considerably different than post-fire assessments for deciduous trees. In addition, the publication specifically addressed the effects of heat from fire, and direct fire injury to conifer bark—the cottonwood tree samples with "puncture-like" wounds on the branches in this case were not affected directly by fire or heat from a fire. Furthermore, the longitudinally aligned wounds on the subject stems did show evidence of fungal canker initiation or colonization of the affected bark tissues.

2.2 While I agree that disease caused by fungi or other pathogens of woody plants does not result in charred (burned) areas on branches, I do not agree that said diseases do not or can not result in completely black, dry, dead areas on branches. As a tree pathologist assessing diseased as well as fire-injured conifers and deciduous trees throughout the United States for the past 40 years, I have observed many degrees of woody plant tissue discoloration, wound responses, and the results of abiotic and biotic agents affecting trees.

2.3 Contrary to Dr. Fulladolsa Palma's assertion, brown, dead tissue surrounding black, charred sections does not always show clear signs of pathogens which may cause wood discoloration or degradation. It all comes down to timing of an infection and subsequent observation, environmental stimuli, and the vitality of a tree's defenses.

Conclusions

1. Strong Chinook winds occurring in the Clark, WY area likely caused intermittent contact of certain branches on the subject cottonwood with the single phase conductor attached to the crossarm near the tree. Having witnessed the effects of strong gale and hurricane-force winds on tree crowns and power lines, it is unlikely that small branches of the subject cottonwood could have made sufficient durable contact with the 7.2kv conductor to have resulted in burned wood and bark to the degree observed on samples collected after the subject fire.

2. The nature and extent of charred wood at the proximal end of branch E1, and the location of the branch on the ground as discovered during the initial fire investigation is confounding regarding the ability to connect the dots between the branch, subject tree, and the fire. Likewise,

[10] Hood, S., I. Ragenovich, and B. Schaupp. 2020. Post-fire Assessment of Tree Status and Marking Guidelines for Conifers in Oregon and Washington. USDA-FS PNW Report No. R6-FHP-RO-2020-02, p. 11

although there are small patches of charred wood on tree sample E11, the origination of these patches is unknown and unexplainable.

3. At least two discrete canker fungi are present on the E-series tree samples. One is a primary pathogen (likely Sooty-bark canker [*Encoelia pruinosa*]), and the other (*Cytospora* sp.) is usually secondary. Typically, Cytospora canker in cottonwood occurs after a tree part becomes injured or severely stressed. In the instant case, it is likely that the black, sooty cankers (longitudinally or randomly located on stems) infected stems in the subject cottonwood from injuries occurring over a two to three year period prior to the subject fire. These injuries likely were caused by stems thrashing about in strong winds, and/or intermittent contact with the adjacent conductors.

4. The erumpent pustules and blackened inner bark tissue of numerous subject twigs and branches are related to fungus canker infections, and not mechanical injuries related to heat or fire as alleged by Plaintiff's expert pathologist. In the 40 years of investigating fire injuries to trees, many of which have involved electric transmission and distribution conductors, I have never observed strictly mechanical injuries on tree parts in the form of longitudinally aligned, black erumpent pustules. Conversely, on occasion I have observed linear rows of small cankers and associated erumpent pustules located in the bark of various tree parts of both conifers and deciduous trees.

Information in this report is based on a reasonable degree of scientific probability. I reserve the right to amend this report, or to produce a supplemental report, in the event additional pertinent information is discovered.

If you have any questions or need clarification of any portion of this report, please let me know.

Sincerely,

Steven Day

Steven J. Day, M.S.
Consulting Arborist & Tree Pathologist

Diagnostic, Technical, Forensic, Appraisal, Research, and Educational Services

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